

## CLAIMS

1. A variable-frequency pulse generator which executes one cycle of output control of the pulse train by two cycles of a reference clock, comprising:

5 an inversion unit which inverts a first reference value regulated by the reference clock;

a selection unit which selects the first reference value after inversion, when an overflow has occurred, and in any other event selects a predetermined value which  
10 changes depending on a set speed;

a data holding unit which latches an output of a previous stage, being the present value of a result of addition, in the second cycle of the reference clock and at a predetermined timing of an overflow prevention signal;

15 an addition unit which adds the value selected by the selection unit and the data latched by the data holding unit;

a first comparison unit which compares the value obtained by the addition unit as a result of addition and the first reference value;

20 a second comparison unit which compares the value obtained by the addition unit as a result of addition and a second reference value which is half of the first reference value;

a judgment unit which judges whether a condition " $0 \leq \text{addition result} < \text{second reference value}$ " is satisfied,  
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or whether a condition "second reference value  $\leq$  addition result  $<$  first reference value" is satisfied, or whether a condition "first reference value  $\leq$  addition result" is satisfied, and outputs a specified signal corresponding to  
5 a result of the judgment;

a pulse train output unit which latches the specified signal at a predetermined timing of the second cycle of the reference clock, and outputs a pulse train of a desired frequency;

10 a third comparison unit which compares the data latched by the data holding unit and the first reference value, and when a condition "latched data  $\geq$  first reference value" is satisfied, judges that the overflow has occurred; and

an overflow prevention unit which outputs the overflow  
15 prevention signal at a predetermined timing of the first cycle of the reference clock, when the third comparison unit has judged that the overflow has occurred.

2. A variable-frequency pulse generator which executes  
20 one cycle of output control of the pulse train by two cycles of a reference clock, comprising:

an addition unit which adds a predetermined value, which changes depending on a set speed, and data latched at a predetermined timing of the second cycle of the reference  
25 clock;

a subtraction unit which subtracts a first reference value regulated by the reference clock from the value obtained by the addition unit as a result of addition;

a first comparison unit which compares the value  
5 obtained by the addition unit as a result of addition and the first reference value, and when a condition "addition result  $\geq$  first reference value" is satisfied, judges that an overflow has occurred;

a second comparison unit which compares the value  
10 obtained by the addition unit as a result of addition and a second reference value which is half of the first reference value;

a selection unit which selects the value obtained by the subtraction unit as a result of subtraction when the  
15 overflow has occurred, and in any other event selects the value obtained by the addition unit as a result of addition;

a data holding unit which latches the value selected by the selection unit at a predetermined timing of the second cycle of the reference clock;

20 a judgment unit which judges based on each the results of comparisons in the first comparison unit and the second comparison unit, whether a condition " $0 \leq$  addition result  $<$  second reference value" is satisfied, or whether a condition "second reference value  $\leq$  addition result  $<$  first  
25 reference value" is satisfied, or whether a condition "first

reference value  $\leq$  addition result" is satisfied, and outputs a specified signal according to a result of the judgment; and

5 a pulse train output unit which latches the specified signal at a predetermined timing of the second cycle of the reference clock, and outputs a pulse train of a desired frequency.

3. A variable-frequency pulse generator which executes  
10 one cycle of output control of the pulse train by two cycles of a reference clock, comprising:

an inversion unit which inverts a reference value regulated by the reference clock;

15 a selection unit which selects the reference value after inversion, when an overflow has occurred, and in any other event selects a predetermined value which changes depending on a set speed;

20 a data holding unit which latches an output of a previous stage, being the present value of a result of addition, in the second cycle of the reference clock and at a predetermined timing of an overflow prevention signal;

an addition unit which adds the value selected by the selection unit and the data latched by the data holding unit;

25 a first comparison unit which compares the value obtained by the addition unit as a result of addition and

the reference value;

a judgment unit which judges whether a condition "the overflow frequency is an even number" and " $0 \leq \text{addition result} < \text{reference value}$ " is satisfied, or whether a condition "the overflow frequency is an even number" and " $\text{reference value} \leq \text{addition result}$ " is satisfied, or whether conditions "the overflow frequency is an odd number" and " $0 \leq \text{addition result} < \text{reference value}$ " are satisfied, or whether conditions "the overflow frequency is an odd number" and " $\text{reference value} \leq \text{addition result}$ " are satisfied, and outputs a specified signal corresponding to a result of the judgment;

a pulse train output unit which latches the specified signal at a predetermined timing of the second cycle of the reference clock, and outputs a pulse train of a desired frequency;

a second comparison unit which compares the data latched by the data holding unit and the reference value, and when a condition " $\text{latched data} \geq \text{reference value}$ " is satisfied, judges that the overflow has occurred; and

an overflow prevention unit which outputs the overflow prevention signal at a predetermined timing of the first cycle of the reference clock, when the second comparison unit has judged that the overflow has occurred.

4. A variable-frequency pulse generator which executes

one cycle of output control of the pulse train by two cycles of a reference clock, comprising:

an inversion unit which inverts a first reference value regulated by the reference clock;

5        a selection unit which selects the first reference value after inversion, when an overflow has occurred, and in any other event selects a predetermined value which changes depending on a set speed;

10       a data holding unit which latches an output of a previous stage, being the present value of a result of addition, in the second cycle of the reference clock and at a predetermined timing of the overflow prevention signal;

an addition unit which adds the value selected by the selection unit and the data latched by the data holding unit;

15       a first comparison unit which compares the value obtained by the addition unit as a result of addition and the first reference value;

20       a second comparison unit which compares the value obtained by the addition unit as a result of addition and a second reference value which is half of the first reference value;

25       a judgment unit which judges whether a condition " $0 \leq \text{addition result} < \text{second reference value}$ " is satisfied, or whether a condition " $\text{second reference value} \leq \text{addition result} < \text{first reference value}$ " is satisfied, or whether

a condition "first reference value  $\leq$  addition result  $<$  (second reference value  $\times 3$ )" is satisfied, or whether a condition "(second reference value  $\times 3$ )  $\leq$  addition result" is satisfied, and outputs a specified signal corresponding  
5 to a result of the judgment;

a pulse train output unit which latches the specified signal at a predetermined timing of the second cycle of the reference clock, and outputs a pulse train of a desired frequency;

10 a third comparison unit which compares the data latched by the data holding unit and the first reference value, and when a condition "latched data  $>$  first reference value" is satisfied, judges that the overflow has occurred; and

an overflow prevention unit which outputs the overflow  
15 prevention signal at a predetermined timing of the first cycle of the reference clock, when the third comparison unit has judged that the overflow has occurred.